

REMARKS/ARGUMENTS

The Office Action mailed November 7, 2005, has been received and reviewed. Claims 1 through 100 are currently pending in the application. Claims 1 through 4, 6 through 9, 13, 14, 49 through 55, 57 through 60, 62, 63, 69, 91, 92 and 99 stand rejected. Claims 5, 10 through 12, 15 through 48, 56, 61, 64 through 68, 70 through 90, 93 through 98, and 100 have been withdrawn from consideration as being drawn to non-elected invention(s).

Applicants have cancelled claims 15-48 and 70-90, amended claims 1, 12-14, 49, 51 and 91, and respectfully request reconsideration of the application as amended herein.

Objection to Specification

The Office Action Summary indicates that the specification is objected to by the Examiner, but the Office Action does not state a basis for such objection. Applicants respectfully request clarification from the Examiner of any such objections to the specification. Upon such clarification, Applicants will correct or amend the specification or otherwise respond appropriately.

Objection to Drawings

The Office Action Summary indicates that the "drawings filed on 15 January 2004 are objected to by the Examiner." However, the Office Action does not state a basis for such objection. Applicants respectfully request that the Examiner review the corrected formal replacement drawings, which were filed with the USPTO on May 10, 2004, as indicated on the USPTO's PAIR website. If the Examiner has objections to the corrected formal replacement drawings filed May 10, 2004, Applicants respectfully request clarification of such objections, and will correct or amend the drawings or otherwise file an appropriate response.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 6,176,492 to Sawai

Claims 1 through 4, 6 through 9, 13, 14, 49 through 55, 57 through 60, 62, 69, 91, and 99 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sawai (U.S. Patent No. 6,176,492). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claims 1 through 4, 6 through 9, 13 and 14

Independent claim 1 of the presently claimed invention is directed to a sleeve element for sealing between a piston element surface and a bore surface disposed thereabout. The sleeve element comprises: a substantially annular body including an inner surface, an outer surface, a first end region, and a second end region; wherein *at least a portion of the first end region of the substantially annular body is configured to be biased laterally into at least one recess* formed in one of the piston element surface and the bore surface; at least one sealing feature formed on the substantially annular body proximate to the at least a portion of the first end region configured to be biased laterally into the at least one recess, the at least one sealing feature sized and configured to sealingly engage against the other of the piston element surface and the bore surface; *at least one depression formed in at least one of the outer surface and the inner surface of the substantially annular body, wherein at least a portion of the at least one depression is sized, located and configured to lie over the at least one recess* to provide increased lateral flexure for the biasing of the at least a portion of the first end region into the at least one recess.

The Examiner cites Sawai as disclosing:

a sleeve element (141) for sealing between a piston (69) and a bore surface (54) comprising:

a substantially annular body (Fig. 12) including an inner surface, an outer surface, a first end region (top half of 81), and a second end region (bottom half of 81); wherein at least a portion of the first end region of the annular body is configured to be biased laterally into recess (84U); at least one sealing feature (portion 81 above the groove 145). (Office Action, page 3).

Applicants respectfully disagree with the Examiner's characterization of Sawai. Sawai describes a piston ring assembly including a piston ring (72). The ring has a main body (81) that is configured to be placed about a piston (56). The piston includes a groove (84) which houses an O-ring (85). The O-ring "bears against a cylindrical inner surface 86 of the piston ring 72 so as to establish the sealing pressure between its outer surface 82 and the cylinder bore surface 55." (Col. 4, lines 37-55). Relief passages (87 and 88) are formed between the inner and outer surfaces of the piston ring to balance pressure between the inner and outer surfaces and prevent fluid pressure from building up on the inner surface which would augment the sealing pressure exerted by the O-ring. (See, e.g., col. 4, lines 56-62). A similar embodiment is described which includes multiple O-rings and utilizes a different pressure balancing arrangement. (See, e.g., col. 5, line 46 through col. 6, line 16).

However, contrary to the Examiner's assertions, Applicants submit that Sawai fails to describe all of the limitations of claim 1. For example, Sawai fails to describe that *at least a portion of the first end region of the substantially annular body is configured to be biased laterally into at least one recess* formed in one of the piston element surface and the bore surface.

While the Examiner points to the element identified by Sawai as "84u" with respect to this limitation, Applicants note that "84u" represents a groove in which an associated O-ring (85u) is disposed to provide a desired sealing pressure. Applicants fail to find any description by Sawai regarding an *end region* of the *substantially annular body* being configured to be biased laterally into at least one recess formed in one of the piston element surface and the bore surface.

Additionally, while Sawai's O-rings are described as being disposed *in* the recess, as has been described above, such O-rings are not an *end region* of the piston ring's substantially annular body.

Additionally, Applicants submit that Sawai fails to describe at least one depression formed in at least one of the outer surface and the inner surface of the substantially annular body, wherein at least a portion of the at least one depression is sized, located and configured to lie over the at least one recess.

As such, Applicants submit that claim 1 is clearly allowable over Sawai. Applicants further submit that claims 2 through 4, 6 through 9, 13 and 14 are also allowable based on their

dependency from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 4, Applicants submit that Sawai does not describe a substantially annular body that is sized and configured to *interferingly* engage the piston element surface with the inner surface of the substantially annular body. This would appear to be clear from Sawai's drawings, the description of the O-rings providing sealing pressure and the description of the piston ring sliding relative to the piston. (See, e.g., col. 4, line 63 through col. 5, line 6).

With respect to claim 7 through 9, Applicants submit that Sawai fails to describe the at least one sealing feature as comprising a first sealing feature configured to be biased laterally into a laterally adjacent first recess formed in the piston element surface in response to contact between the first sealing feature of the substantially annular body and the bore surface. Again, as discussed hereinabove, Sawai does not disclose any portion of its piston ring's annular body being biased into the disclosed recesses (e.g., 84, 84u, 84l).

With respect to claims 8 and 9, Applicants submit that Sawai fails to describe that at least a portion of the second end region of the substantially annular body is configured to be biased laterally into a laterally adjacent second recess formed in the piston element surface in response to contact between the second sealing feature of the substantially annular body and the bore surface.

Applicants, therefore, respectfully request reconsideration and allowance of claims 1 through 4, 6 through 9, 13 and 14.

Claims 49 through 55, 57 through 60, 62 and 69

Independent claim 49 of the presently claimed invention is directed to a seal assembly for sealing between a piston element and a bore surface disposed thereabout. The seal assembly comprises: a piston element having a surface; a sleeve element positioned between the piston element surface and a bore surface disposed thereabout, the sleeve element having an inner surface, an outer surface, a first end region, and a second end region; a first recess formed in the piston element surface; and *at least one depression formed in at least one of the outer surface and the inner surface of the sleeve element, at least a portion of the at least one depression being sized, located and configured to lie over the first recess*; wherein *at least a portion of the first*

end region of the sleeve element is laterally adjacent to the first recess and configured to be biased laterally thereinto; wherein the sleeve element includes a first sealing feature extending from the outer surface thereof, proximate to the at least a portion of the first end region configured to be biased laterally into the first recess, the first sealing feature configured to sealingly engage against the bore surface.

The teachings of Sawai are described hereinabove with respect to the discussion of claim 1. Applicants submit that Sawai fails to describe the *at least a portion of the first end region of the sleeve element is laterally adjacent to the first recess and configured to be biased laterally thereinto*.

While the Examiner points to the element identified by Sawai as “84u” with respect to this limitation, Applicants note that “84u” represents a groove in which an associated O-ring (85u) is disposed to provide a desired sealing pressure. Applicants fail to find any description by Sawai regarding an *end region* of a sleeve element being configured to be biased laterally into at least one recess formed in one of the piston element surface and the bore surface.

Additionally, Applicants submit that Sawai fails to describe at least one depression formed in at least one of the outer surface and the inner surface of the sleeve element, at least a portion of the at least one depression being sized, located and configured to lie over the first recess.

As such, Applicants submit that claim 49 is clearly allowable over Sawai. Applicants further submit that claims 50 through 55, 57 through 60, 62 and 69 are also allowable based on their dependency from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 55, Applicants submit that Sawai does not describe the inner surface of the sleeve element fitting *interferingly* against the surface of the piston element. This would appear to be clear from Sawai’s drawings, the description of the O-rings providing sealing pressure and the description of the piston ring sliding relative to the piston. (See, e.g., col. 4, line 63 through col. 5, line 6).

With respect to claim 57, Applicants submit that Sawai fails to describe that the at least a portion of the first end region of the sleeve element being configured to be biased inwardly into

the laterally adjacent first recess is configured to be biased in response to contact between the first sealing feature of the sleeve element and the bore surface.

With respect to claims 58, 59, 60, 62 and 69, Applicants submit that Sawai fails to describe at least a portion of the second end region of the sleeve element being laterally adjacent to the second recess and configured to be biased laterally thereinto.

With respect to claims 59 and 60, Applicants submit that Sawai fails to describe a first retention flange formed in the piston element surface and adjacent to the first end region of the sleeve element, the first retention flange exhibiting a lateral extent that exceeds a lateral extent of the inner surface of the sleeve element, and a second retention flange formed in the piston element surface and adjacent to the second end region of the sleeve element, the second retention flange exhibiting a lateral extent that exceeds a lateral extent of the inner surface of the sleeve element. While the Examiner points to Fig. 13 as disclosing such subject matter, Applicants fail to see such subject matter disclosed in Fig. 13 or otherwise.

With respect to claim 60, Applicants submit that Sawai fails to describe that the at least a portion of the first end region of the sleeve element configured to be biased inwardly into the laterally adjacent first recess is configured to be biased in response to contact between the first sealing feature of the sleeve element and the bore surface, the first recess formed in the piston element surface, and that the portion of the second end region of the sleeve element configured to be biased inwardly into the laterally adjacent second recess is configured to be biased in response to contact between the second sealing feature of the sleeve element and the bore surface, the second recess formed in the piston element surface.

With respect to claim 69, Applicants submit that Sawai fails to describe the sleeve element, the first recess, and the second recess as being sized and configured to promote *a selected amount of deflection* of the first end region of the sleeve element into the first recess and *a selected amount of deflection* of the second end region of the sleeve element into the second recess.

Applicants, therefore, respectfully request reconsideration and allowance of claims 49 through 55, 57 through 60, 62 and 69

Claims 91 and 99

Independent claim 91 is directed to a method of forming a seal between a bore surface and a piston element surface. The method comprises: providing a piston element having a surface; providing a bore having a surface; providing a sleeve element having an inner surface, an outer surface, an end region, and a sealing feature disposed generally within the end region; *providing a depression in at least one of the inner surface and the outer surface of the sleeve element*; providing a recess formed in one of the bore surface and the piston element surface; disposing the sleeve element between the piston element and the bore surface including *positioning at least a portion of the depression over the recess*; and *biasing at least a portion of the end region of the sleeve element into the recess*.

The teachings of Sawai are described hereinabove with respect to the discussion of claim 1. Applicants submit that Sawai fails to describe forming a seal as described in claim 91 which includes *biasing at least a portion of the end region of the sleeve element into the recess*. Applicants fail to find any description by Sawai regarding an *end region* of a sleeve element being configured to be biased laterally into at least one recess formed in one of the piston element surface and the bore surface.

Applicants further submit that Sawai fails to describe providing a depression in at least one of the inner surface and the outer surface of the sleeve element and positioning at least a portion of the depression over the recess.

As such, Applicants submit that claim 91 is clearly allowable over Sawai. Applicants further submit that claim 99 is also allowable based on its dependency from an allowable base claim as well as for the additional patentable subject matter introduced thereby. For example, Applicants submit that Sawai fails to describe the act of biasing at least a portion of the end region into a recess formed in the piston element surface by sealingly engaging the bore surface against the sealing feature of the sleeve element.

Applicants, therefore, respectfully request reconsideration and allowance of claims 91 and 99.

Anticipation Rejection Based on U.S. Patent No. 5,050,892 to Kawai et al.

Claims 91, 92, and 99 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kawai et al. (U.S. Patent No. 5,050,892). Applicants respectfully traverse this rejection, as hereinafter set forth.

Independent claim 91 is directed to a method of forming a seal between a bore surface and a piston element surface. The method comprises: providing a piston element having a surface; providing a bore having a surface; providing a sleeve element having an inner surface, an outer surface, an end region, and a sealing feature disposed generally within the end region; providing a depression in at least one of the inner surface and the outer surface of the sleeve element; providing a recess formed in one of the bore surface and the piston element surface; disposing the sleeve element between the piston element and the bore surface including positioning at least a portion of the depression over the recess; and *biasing at least a portion of the end region of the sleeve element into the recess.*

The Examiner cites Kawai, without reference to any specific passages, stating that the claimed method reads on “the product of Kawai et al.” Applicants respectfully disagree. Kawai describes a sealing arrangement for a piston in a compressor. The sealing assembly includes a sealing ring (10) which may include flexible lip portions (14) on either end of the outer cylindrical portion. The sealing ring is disposed within a ring groove (25) formed in the piston. A clearance region (P) is maintained between an inner portion of the sealing ring and the piston such that pressurized fluid may flow into the clearance region during operation. When the pressure of any fluid disposed in the clearance region (P) rises above a threshold level, such pressure causes the axially *central* portion of the seal ring to become displaced and biased *outward* from the piston. (See, e.g., col. 4, line 11 through col. 5, line 11).

Thus, Applicants submit that Kawai does not describe all of the acts set forth in the method of claim 91. For example, Kawai fails to describe providing the piston element, the bore and the sleeve element as described in claim 91 and *biasing at least a portion of the end region of the sleeve element into the recess.*

As such, Applicants submit that claim 91 is clearly allowable over Kawai. Applicants further submit that claims 92 and 99 are also allowable as being dependent from an allowable base claim as well as for the additional patentable subject matter introduced thereby.

With respect to claim 92, Applicants submit that Kawai fails to describe elongating the sleeve element to increase the size of an interior surface thereof and disposing the sleeve element about the piston element. While the Examiner asserts that such subject matter is described by Kawai, Kawai actually discloses the sealing ring to be a discontinuous ring having opposite ends. (See, e.g., col. , lines 63-67). Thus, Kawai's piston ring does not need to be elongated such that size of the inner surface is increased, as assumed by the Examiner, to install the seal ring on the piston.

With respect to claim 99, Applicant submits that Kawai fails to describe biasing at least a portion of the end region into a recess formed in the piston element surface by sealingly engaging the bore surface against the sealing feature of the sleeve element.

Applicants, therefore, respectfully request reconsideration and allowance of claims 91, 92 and 99.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 6,176,492 to Sawai in View of the Military Standardization Handbook on Plastics

Claim 63 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawai (U.S. Patent No. 6,176,492) in view of the Military Standardization Handbook on Plastics. Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claim 63 is improper because the references relied upon by the Examiner fail to teach or suggest all of the limitations of the presently claimed invention.

Claim 63 depends from independent 49 by way of intervening claims. As set forth hereinabove, Sawai fails to describe all of the limitations of claim 49. More specifically, Sawai fails to teach or suggest that *at least a portion of the first end region of the sleeve element is laterally adjacent to the first recess and configured to be biased laterally thereinto*. Additionally, Sawai fails to teach or suggest *at least one depression formed in at least one of the outer surface and the inner surface of the sleeve element, at least a portion of the at least one depression being sized, located and configured to lie over the first recess*. Applicants submit that the Military Standardization Handbook on Plastics likewise fails to teach or suggest such subject matter. As such, Applicants submit that claim 63 is allowable over Sawai and the Military Standardization Handbook on Plastics at least by virtue of its dependency from an allowable base claim. Applicants respectfully request reconsideration and allowance of claim 63.

ENTRY OF AMENDMENTS

The amendments to claims 1, 12-14, 49, 51 and 91 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1-4, 6-9, 13, 14, 49-55, 57-60, 62, 63, 69, 91, 92 and 99 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited.

Applicants note that withdrawn claims 5, 10-12, 56, 61, 64-68, 93-98 and 100 should also be allowed upon allowance of a generic base claim from which such claims depend.

Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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